Case study: DeSoto Parish, Louisiana

BRIDGEFORM system stabilized lost circulation in the Haynesville play

Baker Hughes had the opportunity to showcase its proprietary **BRIDGEFORM™ single-sack wellbore strengthening system** while operating in the Haynesville shale. The BRIDGEFORM system improves wellbore stability in microfractured shales and minimizes losses in depleted, fractured, and permeable formations.

The operator selected the BRIDGEFORM system after the reference well on the same pad encountered severe lost circulation that resulted in a well-control incident. Lost circulation and abnormal pressure are major concerns in Holly field.

A typical well drilled in the Haynesville play consists of three sections–surface, intermediate, and production. Lost circulation is usually encountered while drilling the intermediate section and typically occurs in the transition zone between the Cotton Valley Lime formation and the top of the Bossier formation.

While drilling the intermediate hole on the reference well, the operator encountered abnormal pressure that required a mud weight increase from 11.1 to 12.2 lb_m/gal (1,330 to 1,462 kg/m^3) to control and stabilize the wellbore. In addition to the density increase, it was necessary to control mud losses with a conventional lost circulation material (LCM) made of calcium carbonate, mica, and micronized cellulose.

Eventually, the solids control system was bypassed, while the concentration of LCM was increased to 30 lb_m/bbl (85.59 kg/m^3) in the circulating system.

Despite various efforts to control losses, the problem continued. Ultimately, poor hole conditions resulted in difficulties running the intermediate casing to bottom. Lost circulation issues ultimately added 11 days of rig time to the project, increasing the cost of the well substantially.

The experience gained on the reference well proved to be vital in preparing the drilling fluids program for the second well on the pad. Before drilling the intermediate section, a pretreatment that included the BRIDGEFORM system, the Baker Hughes **MIL-CARB™ bridging additive**, and the Baker Hughes **CHEK-LOSS™ fibrous LCM** was added at a depth of 10,400 ft (3,170 m). In addition, the mud weight was increased to 11.5 lb_m/gal (1,378 kg/m^3) prior to drilling into the abnormally pressured formations.

The use of the BRIDGEFORM system enabled the operator to minimize losses and maintain adequate hydrostatic pressure for excellent wellbore stability. Mud losses for the well were reduced by 95% and drilling days were reduced by 11 when compared to the previous well.

Challenges

- Maintain hydrostatic pressure while in a lost-circulation zone
- Reduce lost circulation when conventional products do not perform as expected
- Avoid well losses like those that occurred on the reference well

Results

- Reduced mud losses by 95%
- Lowered overall cost by more than $150,000 USD
- Decreased customer rig time by 11 days
- Nearly eliminated lost circulation on the well